

EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS
ON THE DANIEL BOONE NATIONAL FOREST, KENTUCKY

By

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INTRODUCTION

A biological evaluation of southern pine beetle was made on the London, Redbird, Somerset, and Stearns Districts of the Daniel Boone National Forest during September 1975.

The infestations are part of a Southwide outbreak of southern pine beetle that now involves 13 states. However, the insect has only recently become a problem in Kentucky. Infestations were first discovered in March of 1975 in Bell County. They now occur in six counties (Bell, Harlan, Knox, Leslie, McCreary, Whitley) in the southeastern corner of the state. There have been earlier unofficial reports of southern pine beetle in Kentucky but the current outbreak is the first to be officially recorded.

METHODS

Standard aerial, sketchmap and ground techniques were used to accomplish the evaluation.^{1/} A 50-percent aerial survey was flown and data were expanded to represent 100 percent coverage.

Twenty-four representative spots were ground checked to determine the causal agent, numbers of infested trees, and general condition of the beetle population.

TECHNICAL INFORMATION

Insect - Southern pine beetle, *Dendroctonus frontalis* Zimm.

^{1/} Detection of forest pests in the Southeast. 1970. USDA, USFS, SA, S&PF, Div. of FPM, Pub. S&PF-7, Atlanta, Ga. 51 pp.

Hosts - Southern pine beetle is a native forest pest that will attack all species of southern yellow pine. However, loblolly pine, *Pinus taeda* L., and shortleaf pine, *P. echinata* Mill., are the preferred hosts.

Type of Damage - Death of the tree is the result of mining in the cambium by the southern pine beetle as it constructs egg galleries. The beetle also introduces blue stain fungi, *Ceratocystis* spp., which slow down or block conduction of water in the stem. The size of an infestation may range from a single tree to several thousand trees.

Life Cycle of the Beetle - Southern pine beetles attack in pairs and construct a winding gallery in the cambium. Eggs are deposited in niches along the sides of the galleries. The eggs hatch into whitish grubs that further mine the cambium and then construct cells in the bark where they pupate and change to adults. The new adults then mine through the bark to emerge. The complete life cycle takes about a month during the summer, and as many as four or five generations may be produced annually in the area.

RESULTS AND DISCUSSION

Spots of pine mortality were detected from the air on all four districts. The follow-up ground checking indicated that the spots were caused primarily by southern pine beetle on the Stearns and Redbird Districts, but that Ips beetles (mostly *Ips awulsus*) and black turpentine beetle are primarily responsible for the spots on the London and Somerset Districts (Fig. 1).

Although spots are fairly numerous on the London and Somerset Districts, they are very small on the average. Black turpentine beetle is associated with most 1- and 2-tree spots. Larger spots are caused primarily by Ips beetles. Only one spot larger than 20 trees was detected on these districts. Suppression of Ips and black turpentine beetles is not usually advised, because outbreaks are commonly quite localized, short-lived, and of relatively minor significance.

Southern pine beetle data for the Stearns and Redbird Districts are summarized in Table 1. Spots are numerous (179) on the Stearns District. Fewer spots occur on the Redbird District but they are larger on the average. Over 3,000 trees are currently infested on each district.

The potential is high for rapid growth in numbers and distribution of the southern pine beetle on the Daniel Boone National Forest. Intensive suppression efforts are advisable to restrain the population to whatever extent possible. Concentration of suppression efforts during the winter while the beetle population is least active would be most expedient. Susceptible pine type should be closely monitored for new infestations.

DANIEL BOONE NATIONAL FOREST KENTUCKY

 **SPB INFESTATION**
 **IPS and BTB INFESTATION**

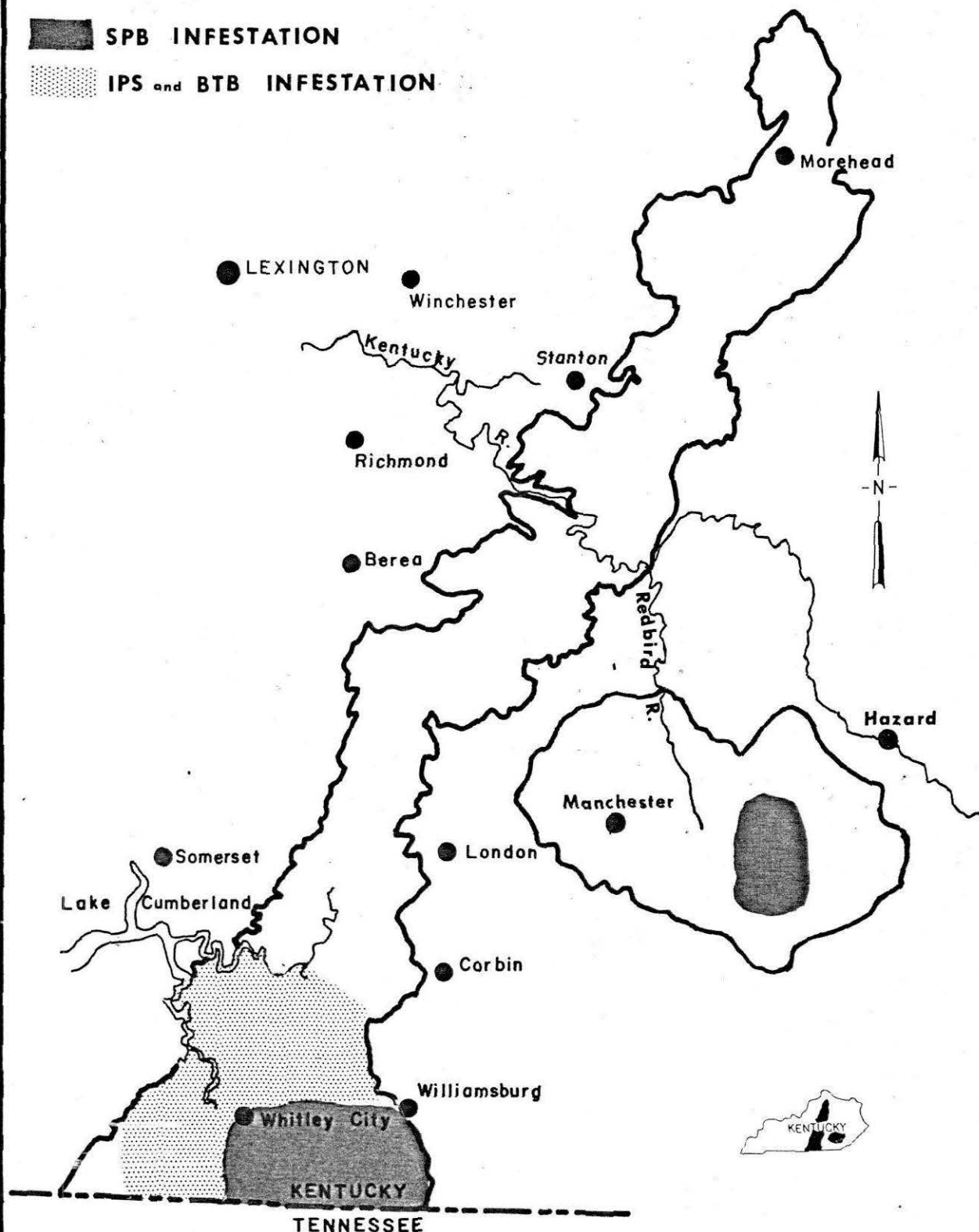


Figure 1. Bark Beetle Infestations on the Daniel Boone N. F., Sept. 1975.

RECOMMENDATIONS

Suppression measures outlined in the 5250 section of the Forest Service Manual are as follows:

1. Removal of Infested Trees by Commercial Sale or Administrative Use. When infested trees of merchantable size are accessible, they should be removed by commercial sale or administrative use procedures. Logging of the infested material should begin immediately. Contract time limits should insure rapid removal.

Where practical, and if host type is present, a 40- to 70-foot buffer strip should be marked and cut adjacent to and ahead of the most recently infested trees. This practice is effective in reducing the possibility of "breakouts." When only a small volume of infested merchantable material occurs in a spot, non-infested trees surrounding the spot may be marked to provide an operable cut.

The order of priority for removing beetle infested timber from a spot should be as follows:

Trees having nearly developed broods (usually the red and fading trees)

Trees having young broods (usually the green, recently infested trees).

Trees in the buffer zone

2. Piling and Burning. Unmerchantable or inaccessible southern pine beetle infestations can be suppressed by cutting, piling, and thoroughly burning the bark of infested trees. The entire bark surface must be thoroughly burned to insure effective control. The order of priority for cutting, piling, and burning infested trees, particularly the large spots, is the same as paragraph (1) under removal of infested trees by commercial sale or administrative use. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts" every effort should be made to locate and treat all green infested trees during the piling and burning operation.
3. Chemical Control. Chemical formulation recommended for southern pine beetle control is a 1/2 percent Lindane spray with No. 2 fuel oil as the carrier. This may be formulated from a 20-percent lindane emulsifiable concentrate or oil concentrate at the rate of 11 pints of concentrate in enough fuel oil to make 55 gallons of spray. (Ratio of one part 20-percent lindane EC to 39 parts No. 2 diesel fuel).

Cut, limb, and buck all infested trees into workable lengths. Spray the infested bark surface to the point of run-off. A compressed air sprayer (3-gallon capacity or equivalent) is an ideal applicator. Infested logs must be turned two or three times to insure complete treatment of infested bark. Spray stumps and bark removed by woodpeckers. Low pressure sprayers may be used to treat large, accessible infestations.

The order of priority for cutting and spraying infested trees in large spots is the same as paragraph (1) under removal of infested trees by commercial sale or administrative use. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts" every effort should be made to locate and treat all green infested trees during the chemical control operation.

Never spray trees from which southern pine beetle brood has emerged. Natural enemies of the southern pine beetle in these trees can then complete their development. To prevent aerial spotters from mapping treated spots, cut trees with red needles from which beetles have emerged.

Instructions for minimizing the adverse effects of mixing, transporting and storing pesticides, applying pesticides and disposing of pesticide containers and excess chemicals are outlined in section 8.3 of the Forest Service Health and Safety Code and FSM 5242.21. Detailed safety procedures should be outlined in the project suppression plan.

4. Reexamination of Treated Areas. Reexamine areas where infested trees were removed by commercial sales, piled and burned, or chemically treated within two or three weeks after treatment to check for additional infested trees. If additional trees are found, treat them.

PRECAUTIONARY PESTICIDE USE STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key -- out of the reach of children and animals -- away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the U.S. Department of Agriculture, consult your county agricultural agent or State Extension specialist to be sure the intended use is still registered.

Table 1. Summary of southern pine beetle survey data for Stearns and Redbird Districts, Daniel Boone National Forest, September 1975.

		Ownership Unit	
		Stearns	Redbird
1. Results compiled from data collected during the aerial phase of the evaluation:			
Survey type	Sketchmap	Sketchmap	
Date of aerial survey	9/15/75	9/15/75	
Total acreage surveyed (national forest land only).	132,000	114,000	
Total susceptible host type	66,000	11,400	
Total number of spots on national forest land	179	32	
Spots per M acre of host type (trees)	2.7	2.8	
Average spot size (trees)	14	91	
Range of spot sizes (trees)	1-150	1-1,000	
2. Results compiled from data collected during the ground and aerial phases of the evaluation:			
Date of ground phase.	9/24/75	9/25/75	
Infested trees per M acre of host type	55.2	274.7	
Total number of infested trees on the national forest	3,640	3,130	
Ratio of green infested to total red and fading trees	1:1.5	1:3.1	
Total volume of infested trees (cu. ft.)	53,920	46,350	